

Difethialone is different

Dr Romain Lasseur from IZIPEST is a French toxicologist with 15 years experience in rodent and insect pest management research. In this article he reminds us of how the anticoagulants have come to dominate professional rodent control and explains how one of them, difethialone, is uniquely placed to meet the requirements of the new EU classification of anticoagulant rodenticides as 'toxic to reproduction'.

Rodents have a large economic impact in both agriculture and urban areas across Europe and, indeed, the world. This is primarily because of their interest in human food sources. As pest professionals know, such rodents carry a lot of different diseases and for this reason rodent control is essential.

Anticoagulant compounds have become the number one method of control because the anticoagulant active in the bait is not detected by the rodents and because the delayed mode of action of these compounds prevents bait shyness, allowing high levels of control to be achieved.

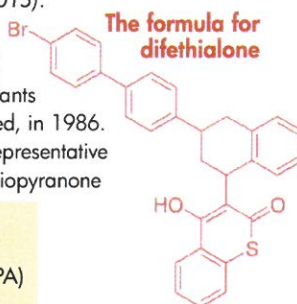
From 1940 to 1980, new anticoagulant compounds were developed to increase the efficacy of control and to combat resistance to first generation compounds (warfarin, chlorophacinone, diphacinone and coumatetralyl) in both the brown rat and the house mouse (RRAC, 2015). The introduction of the first second-generation anticoagulant rodenticides (SGARs), bromadiolone and difenacoum, brought improved efficacy in rodent control.

Widespread use of bromadiolone and difenacoum however led to further rodent genetic adaptations to these two compounds, particularly in the brown rat

and house mouse. Populations resistant to such compounds remain geographically limited, however, due to an apparent biological resistant cost.

To combat this second wave of resistance, three more SGARs were developed: flocoumafen, difethialone and brodifacoum. Those compounds are widely used now in commensal rodent control across Europe, although in the UK their use has been restricted to indoors only. This restriction will change with the new stewardship-compliant labels (see page 7). All three compounds demonstrate a very high efficacy without, up to now, any reported resistant cases in the field (RRAC, 2015).

Difethialone was the last of the anticoagulants to be developed, in 1986. It is the only representative of the benzothiopyranone



CEPA comments on reclassification

Confederation of European Pest Management Association (CEPA) president, Bertrand Montmoreau expects the official announcement on the reclassification – the ATP (Adaptation to Technical Progress) – will be published by the end of June 2016. "This ATP is very significant as it concerns almost all formulations using anticoagulants." Products with concentrations of active substance greater than, or equal to 30 ppm will have to be withdrawn from amateur use.

Despite a phase-in which allows affected products to remain on the market until 30 June 2018, the impact will be immediate. "In reality it will be inconceivable to go on acting as if nothing had happened. Many countries have already indicated that they will not wait to apply the ban," he said.

New marketing authorisations will be required for any replacement products so there will be no short-term solutions. And many professionals will also have to switch either because customers refuse to allow their use and/or because of employee health concerns. "The risk that we will have to prepare to deal with resistance as a result of the almost exclusive use of one single active anticoagulant substance, seems quite evident."



Dr Romain Lasseur

chemical family. Its chemical formula is close to brodifacoum but with the presence of a sulphur (S) atom in the aromatic cycle making it uniquely different.

The sulphur atom in an external position in this compound is a major toxicological advantage as it allows the molecule to be stored in the rodent's liver and, as a consequence, it improves the compound's efficacy.

For 25 years, this active ingredient has been used in baits at a 25 ppm (parts per million) concentration (Lechevin *et al*, 1988). This is the lowest concentration of all the anticoagulant rodenticides, see table.

It means that difethialone baits already meet the regulatory changes that will see all anticoagulant rodenticide active substances re-classified as 'toxic to reproduction' when used in concentrations above 30 ppm – see **Pest** Issues 43: February & March 2016, and 44: April & May 2016.

Products classified as 'toxic to reproduction' cannot be sold to the general public.

Active substance	Generation	Resistance	Concentration (ppm)
warfarin	1	YES (large)	100 to 250
chlorophacinone	1	YES	50
coumatetralyl	1	YES	50
bromadiolone	2 (initial)	YES (partial)	50
difenacoum	2 (initial)	YES (partial)	50
flocoumafen	2 (last)	NO	50
brodifacoum	2 (last)	NO	40
difethialone	2 (last)	NO	25

References

Lechevin, J.C. and Poche, R.M. (1988). Activity of LM2219 (Difethialone), a new anticoagulant rodenticide, in commensal rodents. *Proc. Vertebr. Pest Conf.* Paper 13: 59-63.
RRAC (2015) RRAC guidelines on Anticoagulant Rodenticide Resistance Management. *Technical Monograph 2015. Rodenticide Resistance Action Committee, CropLife International, Brussels.* 29 pp.